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AN IMPROVED SYRINGE HYDROMETER

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The fragility of specific gravity hydrometers is a well-recognized objection to the use of this apparatus, especially outside the laboratory or when used by others than chemists or physicists. Any scheme whereby a hydrometer may be handled with decreased likelihood of breakage is of value.

The vat-side test, described by Bowen (1), for the toxaphene content of emulsions used for cattle dipping specifies the use of an API hydrometer in a syringe. In this equipment there is a double possibility of breakage, because the syringe tubes, as well as the hydrometers obtainable from commercial sources, are made of glass. Breakage of either the syringe tube or the hydrometer may result in inability to perform the test unless a "spare" is carried in the test kit. The hydrometer must also be removed from the syringe between use and in transportation to prevent breakage by the two glass objects jarring against each other. This procedure requires extra handling of the hydrometer and increases the possibility of breakage.

The glass hydrometer (fig. 1, D) may be used with much less possibility of breakage if the glass tube of the syringe is replaced with a rigid transparent plastic tube (C). This plastic tube must be insoluble in or inert to chemical action by the liquid or solutions to be read. For a 7-inch API hydrometer with a float 9/16 inch in diameter, a plastic tube of 3/32 inch wall thickness, 5/8 inch inside diameter, and 11 inches long has been used as the syringe tube. About 20 to 25 ml. of liquid is enough for a gravity reading. A short piece of plastic tubing through the bottom stopper (F and G) may be used to affix the rubber filling tube.

The syringe apparatus should have two retaining inserts, with openings to allow the passage of the liquid and air, at each end of the syringe tube--the upper insert (fig. 1, B) to prevent the hydrometer from either rising into the bulb or falling into the bulb on being inverted, the lower insert (E) far enough from the end of the tube to permit the insertion of a stopper (H) if the filling tube is attached in this manner. These two inserts confine the hydrometer so that it is limited in its longitudinal motion. If the syringe should be dropped and hit on either end, these

inserts, together with the bottom stopper or bulb, act as a double cushion to prevent breakage. If the syringe should fall and light on its side, the bulb (A) and rubber stopper (H) at the lower end would absorb the shock and the hydrometer in the plastic tube would be protected against breakage. A soft rubber square or pentagon-shaped collar about 1/4 inch thick placed around the base of the syringe (G) prevents the apparatus from rolling while lying on its side and acts as an additional cushion when dropped. A fall in which the side of the plastic syringe tube makes a direct hit on the edge of a solid object may break the hydrometer, although such a hydrometer apparatus has fallen in this manner many times without breakage.

Rubber stopper, inserts, and tubing may be used where the liquids or solutions to be tested do not attack rubber, but when xylene or other liquids that do attack rubber are to be read, neoprene or an inert flexible plastic material should be substituted for the rubber at all locations.

This plastic syringe is the ideal carrying case for the hydrometer and eliminates the handling of the spindle, which is necessary where the hydrometer must be removed from the syringe and packed separately. This type of apparatus also offers less possibility of breakage than types in which the hydrometer is used to test the gravity of the liquid in an ordinary cylinder.

Although this apparatus was devised for use in assaying the toxaphene content of cattle-dip emulsions, by the selection of the hydrometer, this improved syringe-type hydrometer may be adapted to wide usage, such as the testing of batteries and radiators.

Literature Cited

(1) Bowen, C. V.
1950. A rapid vat-side test for assaying toxaphene in cattle dips. U. S. Bur. Ent. and Plant Quar. ET-285. 9 pp., illus. /Processed./

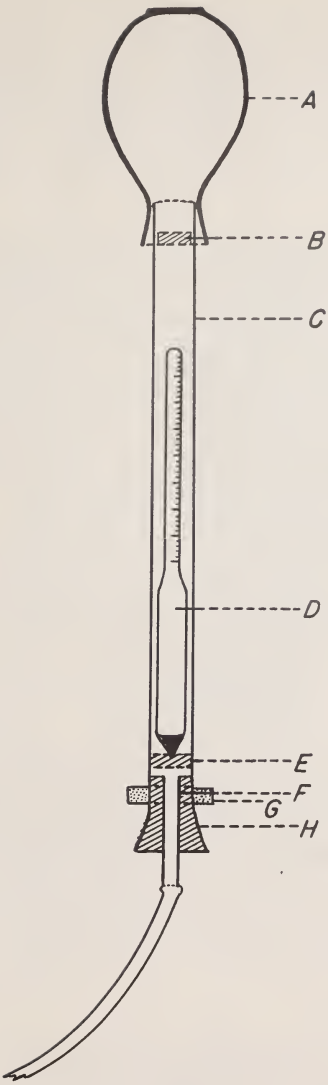

Figure 1.--Improved syringe hydrometer. See text for explanation.